



RESEARCH PAPER

Physico-chemical characterization of short grain aromatic rice of eastern Uttar Pradesh

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Abstract : Grain quality characteristics (Physico-chemical) of forty five short grain aromatic rices were evaluated in the Biochemistry Laboratory, Crop Research Station, (NDUAT) Masodha, Faizabad in 2012. Physico-chemical analysis of collected genotypes revealed that all these rices possess good grain and cooking quality. Among physical parameters of grain quality, the milling per cent among tested genotypes varied from 50.90 to 70.0 per cent. The maximum milling recovery (%) was recorded for Zeeringa shabha collected from Amethi area of district Sultanpur while volume expansion ratio varied from 1.90 to 5.50. Amylose content (%) ranged from 19.25 to 24.10 per cent. The lowest AC (%) was recorded in 'Lalmati (Kurauli, Barabanki)', whereas highest in 'Kalanamak (Tulsipur)'. Intermediate amylase content was recorded for all the tested rice genotypes.

Key Words : Physico-chemical, Amylose, Alkali spreading value, Volume expansion ratio, L/B ratio

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INTRODUCTION

Rice is the staple food of 2/3rd world population and one major source of nutrition to the rice eating population. In Uttar Pradesh rice was cultivated in about 5.9 mha area of total cultivated land with an annual production of 144.64 lac metric ton (Agriculture production in U.P.-2012-13). Rice farming in the state is most vulnerable and risk prone due to complex ecological situations coupled with frequent flood and drought. Area of shallow water sub ecosystem of rainfed lowland of eastern Uttar Pradesh is suitable for 'Kalanamak' and other local aromatic rice. The eastern part Uttar Pradesh is known for its good quality short grain aromatic rices. These short

grain aromatic rices are well adopted to their specific ecological situations and their grain quality is fully expressed if grown in their specific region. Many of these aromatic rice varieties are in cultivation in their native areas since ages. Genetic erosion has been more intense for these traditional aromatic rices and rate of replacement of land races is very fast due to their poor inherent yield potential, susceptibility to prevailing diseases and pests, poor market infrastructure and virtually no incentive for growing such rices. Accordingly these genetic wealth are disappearing from their native place and are in immediate danger. Therefore, there is a need to conserve these precious genetic wealth.

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Table 1 : Physico-chemical attributes of short grain aromatic rices of eastern Uttar Pradesh

Sr. No.	Genotypes	Grain length (mm)	Grain width (mm)	L/B ratio	Seed coat colour	Hulling (%)	Milling (%)	Alkali value	Volume expansion ratio	Amylose content (%)
1.	Lalmati (Gandhi Nagar, Barabanki)	5.2	1.6	3.25	5	60.00	51.90	7	3.0	20.50
2.	Lalmati (Tulsipur)	5.1	1.6	3.18	5	70.00	62.50	6	3.1	21.25
3.	Nanchuniya, (Raibareilly)	5.0	1.4	3.57	1	77.50	60.60	2	2.9	22.20
4.	Kalazeera, (Siddharth Nagar)	5.6	1.2	4.66	2	75.00	59.30	2	3.9	19.50
5.	Kalanamak (Sohratgarh)	6.0	1.2	5.0	7	65.00	55.40	3	3.5	21.30
6.	Kalanamak (Siddharthnagar)	5.8	1.5	3.87	6	70.00	54.60	4	3.7	21.50
7.	Kalanamak (Uskabazar)	5.8	1.4	4.14	6	70.00	56.30	3	3.6	23.20
8.	Chini Kamni (Khalilabad)	5.5	1.5	3.67	6	71.80	63.10	2	3.3	22.40
9.	Kalanamak (Bairdipur)	5.6	1.6	3.5	7	70.00	63.50	6	3.4	22.35
10.	Lalmati (Ranibazar Faizabad)	5.0	1.6	3.12	5	71.25	64.50	7	3.5	21.45
11.	Kalanamak (Basti)	5.3	1.5	3.53	6	70.00	58.90	7	3.8	22.10
12.	Tulsi Amrit (Bhinga Sravasti)	5.4	1.6	3.57	3	67.00	60.30	2	1.9	23.15
13.	Type 3 (Tarun, Faizabad)	6.3	1.0	6.3	1	68.00	65.40	4	5.50	21.50
14.	Lalmati (Raunahi Faizabad)	5.1	1.4	3.64	5	69.50	62.70	5	4.0	22.25
15.	Dhuriya (Azamgrah)	5.5	1.6	3.43	6	70.00	65.30	3	2.5	20.20
16.	Dubraj (Raibareilly)	5.4	1.3	4.15	2	74.50	69.30	4	3.90	22.10
17.	Zeeringa shabha (Amethi Sultanpur)	5.6	1.3	4.30	1	78.20	70.00	5	4.0	21.50
18.	Kalanamak (Nichnaul)	5.5	1.5	3.67	6	79.50	68.50	6	4.12	22.15
19.	Sakkar chini (Payagpur)	5.5	1.0	5.5	1	77.30	55.60	7	4.15	23.20
20.	Lalmati (Kurauli Barabanki)	5.1	1.4	3.64	5	75.30	57.60	6	4.16	19.25
21.	Zeera (Shanna Amethi)	5.7	1.3	4.38	1	74.20	58.60	5	4.0	20.35
22.	Badshah Pasand (Ambedkarnagar)	6.3	1.4	4.05	3	76.00	55.40	4	4.90	22.15
22.	Zeera Battis (Ambedkarnagar.)	5.4	1.3	4.15	1	70.50	68.00	3	5.1	23.15
23.	Sakkarchini (Katka Sultanpur)	5.2	1.1	4.72	2	70.30	63.30	2	5.10	22.00
24.	Badshah Pasand (Malipur)	5.9	1.6	3.69	2	68.50	62.50	4	5.09	23.45
25.	Sakkarchini (Bheriyadeeh Balrampur)	6.0	1.0	6.0	1	70.30	63.50	6	4.98	22.45
26.	Sakarchini (Balrampurk)	5.2	1.0	5.2	2	70.30	64.50	6	4.90	23.50
27.	Sakarchini (Payagpur)	5.3	1.2	4.41	3	70.50	66.50	7	4.50	23.75
28.	Badshahpasand (Purabazar Faizabad)	5.4	1.6	3.37	2	69.00	62.50	6	4.60	21.75
29.	Zuhi Bengal (Siddharthnagar)	5.0	1.6	3.12	3	60.50	53.30	6	4.70	20.80
30.	Kalanamak (Mahrajganj)	5.4	1.6	3.37	7	67.00	61.25	5	4.69	21.75
31.	Type 26 (Sultanpur)	5.9	1.4	4.21	1	69.30	62.30	4	4.90	22.25
32.	Juhi Bengal (Naugarh)	6.1	1.3	4.69	1	70.40	65.50	6	4.70	22.50
33.	Kanak Zeera (Siddharthnagar)	5.0	1.2	4.2	1	68.60	51.60	2	4.65	22.75
34.	Shyam Zeera	5.0	1.3	3.84	6	70.00	60.50	4	4.50	23.15
35.	Kalanamak (Padrauna)	5.5	1.3	4.23	7	68.00	59.70	2	4.40	23.00
36.	Chini Kapoor (Gonda)	5.3	1.0	5.3	1	70.50	58.40	6	4.60	22.10
37.	Lalmati (Rudauli Barabanki)	6.2	1.5	4.77	5	68.00	55.60	7	4.67	21.55
38.	Badshah Pasand (Babaganj Bahraich)	5.3	1.5	3.53	3	69.00	64.50	2	4.60	21.60
39.	Kalanamak	5.3	1.5	3.53	6	65.00	60.50	5	3.67	22.00
40.	Gopal Bhog (Santkabirnagar)	6.0	1.8	3.33	3	66.20	55.40	3	3.60	23.25
41.	Kalanamak (Tulsipur)	5.3	1.5	3.53	7	70.30	54.60	4	3.90	24.10
42.	Kalanamak (Pachperwa)	5.4	1.5	3.6	7	68.10	63.00	5	4.30	22.15
43.	Sakkar Chini (Maskanwa)	6.0	1.5	4.0	1	69.20	50.90	7	4.50	21.80
44.	Badshah Pasand (Gosaiganj, Faizabad)	5.5	1.4	3.92	2	70.10	65.40	5	4.52	21.50

In view of the above observations short grain aromatic rices were collected from their native places of eastern Uttar Pradesh and their grain quality traits were physico-chemically evaluated for their characterization.

MATERIAL AND METHODS

Altogether grain samples of forty five short grain aromatic rice varieties were collected from different districts of eastern Uttar Pradesh. The grain samples were sundried and purified for physicochemical evaluation.

Physical characteristics :

Grain length and width :

Grain length and width of the decorticated grain was measured with seed caliper and recorded in Table 1.

Hulling percentage :

100 g of rice seeds were de-hulled using a standard de-husker (Satake rice huller) and the average whole-grain yield was calculated (Anonymous, 2004).

Milling percentage :

The dehulled rice grain samples were milled using MC Gill type laboratory rice miller and milling percentage was calculated (Anonymous, 2004).

Chemical characteristics :

Alkali spreading value (ASV) :

Six milled rice grains were taken in Petri plates and 10 ml of 1.7 per cent of KOH was added and kept in incubator at 27-30 °C for 23 hours. Then the alkali spreading value was calculated as low, low-intermediate, intermediate or high (Perez and Juliano, 1978).

Amylose content (AC) :

To 100 mg of rice flour 1 ml of 95 per cent ethanol and 9 ml of 1.0 N NaOH was added. This was mixed well and heated in a boiling water-bath for 10 min. Samples were diluted to 100 ml with distilled water. From this suspension, 5 ml of sample was taken and 1 ml of acetic acid (57.75 ml in one lit. water) was added to acidify the sample along with 1.5 ml of iodine solution (0.2% iodine + 2% potassium iodide) and the volume was made to 100 ml with distilled water. The samples were incubated at room temperature for 20 min. The

absorbance was measured at 620 nm using spectrophotometer. As a control, NaOH solution was used. The AC of different short grain aromatic rices was calculated in comparison with standard graph and presented in Table 1.

RESULTS AND DISCUSSION

Data presented in Table 1 show that there was wide range of variation for physio-chemical traits among tested short grain aromatic rices. The milling per cent among tested genotypes varied from 50.90 to 70.0 per cent. The maximum milling recovery (%) was recorded for Zeeringa shabha collected from Amethi area of district Sultanpur. The volume expansion ratio among the tested genotypes varied from 1.90 to 5.50. It was found maximum in rice genotype Type-3 (5.50) collected from Tarun block of Faizabad district followed by Zeera Battis (5.1) collected from Ambedkarnagar. The alkali spreading value (ASV) was calculated for all the rice genotypes. The alkali spreading value among the tested genotypes varied from 2 to 7. The cooked rice of genotypes showing alkali spreading value 7.0 will be soft. The intermediate ASV (5.0) indicated the medium disintegration and classified as intermediate GT which is highly desirable for quality grain. Among short grain aromatic rices, amylose content (%) ranged from 19.25 to 24.10 per cent. The lowest AC (%) was recorded in 'Lalmati (Kurauli Barabanki)', whereas highest in 'Kalanamak (Tulsipur)'. Intermediate amylase content was recorded for all the tested rice genotypes.

On the basis of physico-chemical analysis it was concluded that these collected genotypes of short grain aromatic rices possessed good grain quality and their conservation is urgently required to maintain genetic diversity among short grain aromatic rices.

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